ENVIRONMENTAL MANAGEMENT LESSONS LEARNED FROM INTERVIEWS WITH INDUSTRY MANAGERS

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INTRODUCTION

The Department of Energy (DOE) Office of Environmental Support is sponsoring a project to evaluate the effectiveness of the current compliance-driven environmental protection and assessment efforts relative to ecological risk concerns and to explore the need for a more holistic, integrated approach to address ecological risks at DOE facilities (Kelly et al., 1996). The evaluation is based on interviews with environmental managers responsible for implementing environmental protection and compliance programs at selected DOE and industry facilities.

Industry facilities were included in the study to provide a basis for comparison of DOE and industry approaches and issues and to glean useful information for DOE environmental managers from industry. This report documents the environmental management lessons learned from the industry interviews. These interviews were conducted with environmental managers from several large petroleum, mining, rubber, brewing, aerospace, and computer manufacturing companies. Although the project is focused on ecological impact assessment issues, the interviews with industry managers provide valuable lessons learned in the general area of environmental management.

A study of pollution prevention programs at "best-in-class" industry facilities found that successful environmental programs developed their approaches consistent with the "culture" of their facilities (Price, 1993). A major challenge in applying lessons learned from industry is their adaptation to the DOE culture. Future work will explore issues associated with the implementation of relevant and useful industry initiatives within the DOE culture.

METHODS

Interview questions were aimed at determining industry approaches to environmental compliance/protection. Through this process, we hoped to

1. determine what level of integration exists between various environmental compliance, protection, and safety programs and to determine if there is a perceived need to have better integration;
2. identify the current efforts to integrate activities and find out what motivated these activities;
3. understand the role of environmental evaluations, ecological impact assessment; and ecological risk assessment in environmental decision making;
4. identify any efforts that are under way to implement an ISO 14000 approach; and
5. determine why an ISO 14000 approach is being implemented and what problems or successes have been encountered.

Interview questions covered five areas: (A) documenting the backgrounds of the respondent and their responsibilities, (B) defining the environmental compliance drivers and the use of assessments, (C) determining if environmental management systems such as ISO 14000 were being used, (D) defining the characteristics and effectiveness of environmental management protection and compliance programs, and (E) determining the funding sources and costs of environmental programs. The questions asked are listed in Appendix A. Telephone interviews with respondents lasted about 1 h, and written notes of responses were taken. No attempt was made to conduct a statistically valid survey, thus, the results should be viewed simply as the opinions of those individuals interviewed.

RESULTS AND DISCUSSION

For the purposes of this report, individual survey responses are not reported. Responses are summarized as industry lessons learned and are grouped into four categories: cost-effective approaches, integration / management approaches, environmental management systems (ISO 14000), and costs.

Cost-Effective Approaches

Research, Monitoring, and Assessments Provide Multiple Benefits

Industry respondents viewed ecological benchmark levels as often being overly conservative and resulting in cleanups that are too expensive and not providing significant risk reduction. Rather than accepting regulatory benchmark levels for lead, one company invested in field feeding studies of the bioavailability of lead. These studies resulted in much higher cleanup levels and a savings of $65 million.

One respondent noted that ambient water quality criteria can be adjusted for site-specific toxicity by modifying factors using the Environmental Protection Agency's (EPA's) water effects ratio method. This respondents company uses this site-specific approach to adjust standards, reducing water treatment costs and subsequent violations while providing the same level of protection of the environment as set by the criteria.

An industry environmental manager stated that in his experience, the higher the quality of the assessment data, the better the science, the more focused the remediation objectives, and the lower the costs. He stated that quality data come from careful planning.

Respondents said that their companies realized the value of ecological assessments after they had incurred National Resource Damage Assessment (NRDA) liability and extensive remediation costs. For many of these companies, ecological assessments are now a regular part of all business decisions. As costs incurred through NRDA liability have grown, so has the perceived value of doing ecological assessments. Respondents emphasized that conducting Comprehensive Environmental Response and Liability Act (CERCLA) Remedial Investigation / Feasibility Study (RI / FS) activities under the cloud of NRDA litigation becomes extremely difficult and is something to avoid if at all possible.

Audit the Auditors

Many companies report that internal and external audits are useful and cost effective when the auditors know the "big picture" issues and do not focus on quality assurance / quality control minutia. They recommend auditing the auditing programs to ensure that the programs are effective rather than conducting more audits. They also recommend developing measures for the effectiveness of auditing programs. A large company with many facilities uses one outside auditing contractor to audit all of its facilities. The company feels that this auditing process is a very cost-effective program that provides for consistency across facilities and has reduced violations and fines. Auditors report to top-level managers.

Experienced Staff Increase Regulator Trust

A large company with multiple facilities uses one corporate-level team of experts for negotiations with regulators. The team is very experienced and skilled. The reputation of the team leads to regulator trust, resulting in less conservative assumptions required for assessments, which leads to lower remediation costs.

Employee Cash Reward Programs Are Very Effective

Several companies find that employee reward systems work to save costs, increase compliance, and improve environmental protection. These reward systems are significant (for example, one company gives $2000 cash rewards).

Collect Data to Support Decisions

Industry data collection activities are generally very focused on decisions that need to be made. Decisions are often business related, e.g., to introduce a new product, to acquire a new facility, etc. Decisions are clearly stated and clearly linked to the data collection process.

Accountability of Managers Leads to Decisions and Efficiency

One industry environmental manager described two CERCLA experiences, one at the company's own Superfund site and another at a Department of Defense (DoD) Superfund site that the company manages. At its own facility, the company spent $22 million to clean up 22 CERCLA sites. At the DoD facility, as of today, $30 million has been spent to complete the RI, and no cleanup has occurred. These two CERCLA sites resulted from the same industrial activities, are similar in scale, and have similar contaminants. The environmental manager indicated that the reason for this disparity is that the DoD site is bogged down in bureaucracy, there are no clear lines of authority. Cleanup decisions are risky and there is no liability for not making decisions within DoD; therefore, the tough decisions do not get made. The tendency is just to continue to study the problem. In industry, the managers are motivated to make the tough decisions because they must control costs or lose their jobs.

Environmental Management Pollution Prevention Activities/Decisions Should Be Proactive

Several companies indicated that they take a proactive approach to environmental compliance. They anticipate potential problems and take steps to avoid them: "Issues are anticipated and holistically managed."

These companies currently are working aggressively to eliminate sources of contamination, including dramatic reductions in National Pollutant Discharge Elimination System (NPDES) discharges, essentially zeroing out the amount of reportable hazardous material under the Superfund Amendments and Reauthorization Act (SARA), achieving 90% reduction in Resource Conservation and Recovery Act (RCRA) hazardous waste, and reducing air emissions to below regulatory concern. Their goal is to ultimately put the environmental compliance groups out of business. One company has gone from an environmental compliance staff of 63 people to a staff of 32 people in 3 yr. An interesting summary of one company's experience moving from a major polluter to an environmental steward, is documented by Dykema and Larsen (1993). This transition was motivated by costly regulatory actions, litigation, and negative publicity.

The Business Roundtable benchmark study determined the critical elements of the pollution prevention programs of six "best-in-class" industry facilities (Price, 1993). Three groups of critical elements were noted after review of the responses to 152 interview questions: (1) the initial elements used to set up the program, (2) the elements that helped achieve outstanding performance, and (3) the elements that sustained the program excellence. There were five initial elements to success.

- Facilities were led by a clear vision / mission or policy statement.
- Facilities had a means to identify all wastes and emissions.
- Facilities had demonstrable pollution prevention goals.
- Facilities had a single focal-point person—a champion of the program.
- Management supported the pollution prevention program with personal commitment and needed resources.

The elements identified to achieve outstanding performance include the actions listed below.

- Pollution prevention was made a fundamental part of business planning.
- Waste streams were prioritized.
- Cross-functional multidisciplinary teams were used.
- Programs were cost-effective and used both financial and other criteria to evaluate projects' cost-benefit.
- Pollution prevention progress was measured, compared with goals, and reported to key managers.
- Programs used total quality management.
- Programs were results-based with identified responsibility and accountability.
- All pollution prevention programs were done by on-site teams who knew their plant culture and designed the programs to work in that culture. No programs were designed or implemented by outside consultants.

The elements that helped sustain the successful programs included several approaches.

- Recognition and rewards sustained employee motivation.
- Resources were provided to support program.
- Effective communication increased pollution prevention awareness.
- Pollution prevention was integrated into manufacturing decisions and choices.
- New technology was used to achieve significant improvements.

Integration / Management Approaches

Centralized Corporate Expertise

Several companies have found that having one corporate manager to whom all facility CERCLA managers report is important for consistency and integration. This corporate manager is a single point of contact and has responsibility for the company CERCLA activities. A large company with many facilities found that having a centralized, corporate-level CERCLA team saved resources, provided consistency, reduced liability concerns, and improved negotiations with the regulators. Initially, the company had separate CERCLA teams at each operating facility, but the company found problems with this approach: (1) no strong core group developed the necessary experience to deal effectively with costly cleanup and NRDA liability issues; (2) there was no build-up of experience as different facilities developed new, generally inexperienced teams; (3) the different facilities developed different and often conflicting approaches; and (4) negotiations with the regulatory agencies were uneven and often the positions of the different facilities were in direct opposition to each other. The corporate centralization of the CERCLA activities eliminated these problems.

At least one company has a corporate-level expert compliance team that is available to all operating facilities. This team is "free" (funded out of company overhead), small, and very good. The bottom line for operation managers is cost of business. The managers use this free resource regularly because it keeps their costs down. The team also promotes integration and consistency between facilities.

Personal Accountability

Industries were clear that environmental violations result in termination of the responsible individual(s). This approach was characterized as the "one strike and you're out" approach.

Top Management Commitment to Environmental Programs

Several companies indicated that the top-level managers (the board of directors) are actively involved in environmental compliance and protection issues. Several large companies with multiple facilities promoted integration of activities by organizing working groups consisting of representatives from different facilities and providing joint training of environmental managers from different facilities.

Environmental Management Systems (ISO 14000)

Industry is Moving Ahead with an EMS Approach

Several companies noted that they either have or are in the process of adopting an ISO 14000 Environmental Management System (EMS) approach. Reasons include (1) "it just makes good sense," (2) "need a system to measure what you are doing and how well you are doing" ("upper management can assume things are getting done when they aren't"), and (3) "need a clear management system, with clear lines of responsibility and internal and external auditing."

Managing Information is Critical to Environmental Management

Information systems were identified as important support tools for environmental management issues such as ensuring compliance, measuring performance, managing emissions, and reducing hazardous waste. One interviewee provided a copy of a paper that describes the Anheuser-Busch information system, which supports environmental management (Bamberger, 1996). At Anheuser-Busch, the integration of environmental management is accomplished through support in the form of a PC-based program called the Environmental Quality Manual (EQM). The EQM has four main functions.

1. Demonstrates to each facility how to comply with the corporate requirements by development and use of a site-specific EQM
2. Tracks activities using a calendar feature
3. Measures performance though a self-assessment tool
4. Provides consistency and backup for facility environmental management when staff is unavailable or the facility experiences personnel turnover

The respondent noted that successful implementation of an information system requires that it provide benefits to compliance needs and/or contributes to the company bottom line. The major lesson learned in implementing an environmental management system involved not technical hurdles but people-related issues. Convincing people in different organizations throughout the company was a major challenge met through effectively communicating the vision as embodied in the corporate environmental policy and missions statements, which were strongly supported by top management. The respondent felt strongly that people have to believe that the system will change before any changes can be initiated or implemented.

Costs

Total costs for environmental compliance for the companies ranged from 2.5% to less than 5% of gross. (These estimates do not include potential NRDA costs.)

According to a minerals company 1994 annual report, the company spent $107 million on "environmental spending" out of total expenses of $2481million (4.3%). Compared with their total 1994 revenue of $2788 million, environmental spending was 3.8%.

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APPENDIX A
INDUSTRY INTERVIEW QUESTIONS

A. Respondent Background

1. Job Title:
2. Current major responsibilities:
3. Past major responsibilities:
4. Education / training background:
   (BS, MS, Ph.D., Military, Other)
5. What type of industry?
6. Can we use your company name?
7. Describe the nature of your experience dealing with:
   Characterize as None = 0 ---> Extensive = 10
   - NEPA
   - CERCLA
   - NRDA
   - RCRA
     - Closures
     - Operations
     - RFI / CMS
   - CWA
   - CAA
   - ESA
   - OSHA
   - TOSCA
   - FIFRA
   - FDCA
   - OTHER

B. Compare industry and DOE's environmental compliance drivers and assessments.

1. What are your drivers for environmental compliance, environmental protection, and environmental safety?
   Which are you responsible for ?
   Which require *environmental assessments*?
2. What are your primary environmental compliance / protection and safety issues?
3. Which are you responsible for?
4. Which require *environmental assessments*?
5. What is included in these *environmental assessments*? Are *risk assessments* used?
   (Natural History or T&E Survey, Habitat Evaluation, Biomonitoring, Media Concentrations, Fate and Transport, Toxicity Identification / Reduction Evaluation, Water, Sediment, Soil Toxicity Studies, Product Registration Testing, Natural Resources Damage Assessments, etc.)
6. What decisions are supported with *environmental assessments* and related data collection activities (clean-up goals, compliance documentation, process improvements, design, planning, litigation support)?
7. How are the results of these *environmental assessments* used in decision making?
8. What process do you go through to establish data needs for *environmental assessments*?
   (Are DQOs defined?)
   Do you involve regulators and other stakeholders?
   If yes, how and when (during plan development or during review and approval)?
9. Are *ecological impact assessments* conducted?
10. If so, by what methods (expert judgment, injury under NRDA, ERAs following EPA framework)?

How are ecological impacts quantified (qualitative or quantitative risk assessment, comparison to standards)?

11. How are results of *ecological impact assessments* used in decision making?
12. What are the issues associated with the use of *ecological risk assessments*? (Guidance, Benchmarks, Methods, Data Collection, Uncertainty)
13. If ecological risk assessments are not currently being used in decision making, do you anticipate ERAs will be required / useful in the future?
    If so, why and how?
14. Do subcontractors or in-house experts conduct environmental assessments?
    What is the role of each?

C. ISO 14000 (EMS)

1. Have you or any of your peers evaluated the ISO 14000 approach to Environmental Management Systems (EMS)?
   If so, what are your impressions?
2. Have you or your peers implemented an EMS approach (even if not part of 14000)?
   Why choose an EMS?
   Why choose not to have an EMS?
3. If you or your peers have or are implementing an ISO 14000, what are the advantages?
   What are the disadvantages for ISO 14000?

D. Compare industry environmental compliance/environmental protection with DOE's.

1. Does your / your client's company have a clear environmental policy?
   How would you describe the policy; a global statement or is it specific, detailed, and substantial?
2. At what level of management are environmental issues addressed?
3. Does upper management have an effective mechanism to evaluate environmental / protection / compliance / safety programs? Yes No
   If so, what is it?
4. What organizational structures are used to carry out your environmental compliance and protection programs?
   Are responsibilities divided across specific media or regulatory programs?
   If not, how are they divided?
5. How would you describe the relative importance of regulatory compliance versus the company environmental policy with regard to motivating the environmental programs your company has in place?
6. Are environmental programs integrated across facilities or does each facility have its own programs (structures)?
   If there is integration, how is this accomplished and what does it entail?
   What motivated the integration efforts?
7. Is there an attempt to integrate activities of the programs (structures) within facilities?
   If so, what was the motivation for integration?
   What are the integrating activities?
8. How are negotiations with federal and state regulators handled?
   Who has responsibility?
   What problems, if any, are associated with these negotiations?
   Can you identify some particularly notable successes and briefly describe them?
   Are negotiations with state regulators handled differently?
9. What are the consequences of non-compliance?
   To the company (liability, corporate image)?
   To the responsible individual(s)?
10. What metrics are used to evaluate continuous improvement in the environmental arena (e.g., number

of violations, levels of fines assessed on an annual basis, number of public or worker complaints, awards for achievement, positive or negative news stories)?

E. Funding basis and cost issues.

1. What per cent of overall budget is spent on environmental compliance / environmental safety?
2. What environmental programs are viewed as cost-effective versus not cost-effective? Why?
3. What are the implications of environmental costs for company operations?
4. How are funding levels for the various environmental compliance / protection programs determined?

Definition of Terms Used in Questions:

Environmental Assessments:
Generic activity where impacts to the environment are assessed.

Ecological Assessments:
Impacts to ecological resources assessed.

Ecological Risk Assessments:
Likelihood of a stressor causing an adverse ecological effect.